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Nicolai V. Kuminoff

Darrell J. Bosch

Dan Kauffman

Jaren C. Pope

Kurt Stephenson

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*by Nicolai V. Kuminoff, Darrell J. Bosch, Dan Kauffman, Jaren C. Pope, & Kurt Stephenson**

Introduction

Consumers respond to names and labels on food products. In the seafood industry, this has led to the renaming of species that sound like they would taste bad. For example, "slimehead" (*Hoplostethus atlanticus*) was renamed as "orange roughy" in order to increase its marketability in restaurants and supermarkets.[1] Unfortunately the marketing strategy worked too well. After first becoming widely available in the United States in the 1980s, this New Zealand and Australian fish became so popular that it was overfished and the population crashed.[2] Today, orange roughy is on the Monterey Bay Aquarium's "Seafood Watch" list of fish to avoid.[3] The Seafood Watch list is part of a growing effort by independent organizations and government agencies to inform consumers about the health of fisheries and the sustainability of their harvesting practices. The seafood industry has begun to use this information to develop ecolabels for fish caught from fisheries that are managed sustainably.

Ecolabeling refers to placing a seal of approval on a product to recognize that it has been certified as meeting specific criteria for the environmental impacts of its production process. The largest independent certification program for fisheries is the Marine Stewardship Council ("MSC").[4] Wild fisheries that satisfy the Council's criteria for sustainability may display its seal on their products.[5] This ecolabel is intended to induce consumers to pay a premium for sustainable seafood or to consume MSC certified products rather than unlabeled seafood. If consumers are willing to pay a premium for ecolabeled seafood, they will provide an economic incentive for fisheries to shift toward more sustainable production practices.

Seafood bearing the MSC label is currently sold in thirty-nine countries and can be found in major supermarkets including Wal-Mart and Whole Foods.[6] Since the number of fisheries currently seeking MSC certification is more than twice as large as the number currently certified, the supply of ecolabeled seafood will continue to grow in the near future.[7] This article describes the growing market for ecolabeled seafood and provides an economic perspective on emerging legal and policy issues. We begin with an overview of the different ecolabeling schemes, with emphasis on the Marine Stewardship Council. We then summarize the state of knowledge on the demand for ecolabeled seafood and discuss three issues: conflicting labeling claims, the impact of ecolabeling on the demand for fish which are harvested sustainably but not sold under an ecolabel, and the effect of ecolabeling on the health of aquatic ecosystems.

Seafood Ecolabeling and the Certification of Sustainable Fisheries

Perhaps the first non-governmental effort to bring fisheries management to the attention of consumers was the Earth Island's Institute campaign for "dolphin safe" tuna. The campaign took off in 1988, when an Earth Island employee videotaped dolphins drowning in tuna nets.[8] This campaign was instrumental in passing federal legislation and getting major U.S. tuna packers to change their harvest practices and put "dolphin safe" labels on their cans.

In 1996 the World Wildlife Fund and Unilever, a multinational corporation, jointly developed an independent organization to certify sustainable fisheries—the Marine Stewardship Council.[9] Subsequently, other independent certifying organizations have been formed, such as the Monterey Bay Aquarium's Seafood Watch program.[10] Meanwhile, industry groups such as the Alaska Seafood Marketing Institute have developed their own sustainability criteria.[11] International growth in seafood ecolabeling has also led the Food and Agriculture Organization of the United Nations to issue broad guidelines for ecolabeling of marine products.[12] Domestically, the U.S. National Oceanic and Atmospheric Administration's ("NOAA") Fish Watch program tracks whether specific fisheries meet the ten conservation and management standards defined by the Magnuson-Stevens Fishery Conservation and Management Act.[13] For the interested seafood consumer, there is clearly a wealth of information about the sustainability of fisheries.

Today, the Marine Stewardship Council is still the largest independent third-party certification program and its sustainability seal is the most widely recognized seafood ecolabel.[14] The label is intended to provide consumers with information about

* *The authors are faculty members of the Department of Agricultural and Applied Economics at Virginia Tech University. Nicolai V. Kuminoff (Assistant Professor) can be reached at kuminoff@vt.edu. His research focuses on developing methods to assess the value of environmental amenities and using this information to evaluate public policy. Darrell J. Bosch (Professor) can be reached at bosch@vt.edu. His research areas include risk analysis, economics of nonpoint source pollution control, drinking water infrastructure management, watershed management, and greenhouse gas mitigation opportunities in agriculture. Dan Kauffman (Extension Specialist) can be reached at dkauffma@vt.edu. He does applied research particularly in the marketing area and his current interests include business management, marketing, and economics as they relate to the seafood industry. Jaren C. Pope (Assistant Professor) can be reached at pope@vt.edu. His current work focuses on identifying the role of imperfect information in markets where decision making is complex. Kurt Stephenson (Professor) can be reached at kurtz@vt.edu. His research focuses on water resource issues, the use of economic incentives in environmental policy, the role of economic analysis in environmental policy, and institutional economics.*

the sustainability of the seafood they purchase in order to help them make informed decisions in the marketplace.[15]

To receive MSC certification, a fishery must demonstrate that it complies with three broad principles for sustainable fishing:[16]

> MSC Principle 1: A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.
>
> MSC Principle 2: Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.
>
> MSC Principle 3: The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.[17]

These general principles underlie twenty-three specific criteria that each fishery must satisfy in order to license the MSC ecolabel.[18] For example, one of the criteria that must be satisfied under MSC Principle three is that mechanisms must be in place to limit or close the fishery when designated catch limits are reached.[19] Likewise, fisheries must demonstrate that they do not use poisons or explosives.[20]

A fishery seeking MSC certification can hire an independent certifier who has been accredited by MSC to determine whether their harvesting practices meet MSC standards.[21] Certification lasts for five years and a fishery is also subject to annual audits.[22] After a fishery has received certification, manufacturers and processors who want to use the MSC logo must pay an additional licensing fee to do so.[23]

Since 1997, the Marine Stewardship Council's ecolabel has been licensed by nearly fifty different seafood brands and over 200 specific products, which are sold in restaurants and national supermarket chains in the United States.[24] This is not limited to small organic groceries and local health food stores. National retail chains have become interested in the MSC label. Whole Foods, the nation's largest retailer of organic foods, started supporting the MSC label in 1999.[25] In February 2006, Wal-Mart announced that it would purchase all of its wild-caught fresh and frozen seafood from MSC certified fisheries within three to five years.[26]

One limitation of the Marine Stewardship Council's certification program is that its standards only apply to wild capture fisheries. MSC does not currently certify aquaculture and has no plans to do so in the future.[27] Other independent organizations do monitor aquaculture. The Monterey Bay Aquarium's Seafood Watch Program, begun in 1999, developed a "stoplight" system for reporting the sustainability of both wild caught and aquaculture fisheries. Its regional "pocket guides" use color coding to tell consumers whether a particular fish is a best choice (green), a good alternative (yellow), or a fish to avoid (red).[28] Compared to MSC, Seafood Watch is more comprehensive in its coverage. Fisheries do not pay to be evaluated. Seafood Watch conducts independent audits of major fisheries that serve different regions of the country.[29] From an industry perspective, however, Seafood Watch's pocket guides are more difficult to integrate into product labeling than the MSC label because the guides are updated biannually whereas MSC certification lasts for five years which facilitates longer term planning.

Have the Marine Stewardship Council, Seafood Watch, and other ecolabeling programs been effective in promoting marine conservation and sustainable fishing practices? At the time of writing, thirty-five fisheries are certified by MSC and another seventy-eight are undergoing the assessment process for potential future certification.[30] These fisheries, which are located around the world, have perceived the potential economic gains from ecolabeling to be sufficiently large to induce them to pay independent certifiers to verify that their fishing practices meet MSC standards. Whether their short run investment in certification will translate into higher profits in the long run will depend on the extent to which ecolabels increase the demand for sustainable seafood.

The Demand for Ecolabeled Seafood

Market data on the sales of ecolabeled seafood are only beginning to become available. Without access to sales data, seafood economists have traditionally relied on statistical analysis of consumer surveys to assess the potential demand for ecolabeled products. In one of the first studies of the demand for ecolabeled seafood, economists at the University of Rhode Island conducted a mail survey of 1,640 potential seafood consumers in the lower forty-eight states during the fall of 1998. Participating households were asked to make a hypothetical choice between two regular seafood products (cod and shrimp) and ecolabeled versions of the same products that would cost up to five dollars more per pound.[31] The survey results indicated that consumers would be willing to pay a premium for ecolabeled seafood, but that the size of the premium would differ across seafood products and consumer groups. Consumers with larger budgets and those who were members of environmental organizations were more likely to be willing to pay a premium for ecolabeled products.[32] These results were reinforced by subsequent surveys of consumers in the United Kingdom.[33]

While consumers say they are willing to pay more for ecolabeled seafood, it is less clear whether the increasing availability of ecolabeled products will have a large impact on their purchasing decisions. Recent evidence suggests that while consumers would be willing to pay more for ecolabeled versions of their favorite fish products, this "ecolabel effect" is too small to convince average consumers to switch from their favorite fish (without an ecolabel) to a less preferred fish (with an ecolabel).[34]

As more ecolabeled seafood products have entered the market, there have been some preliminary efforts to measure the effects on demand. For instance, preliminary evidence from supermarket scanner data suggests that the introduction of the dolphin-safe tuna label increased the market share of canned tuna by one percent between 1990 and 1995.[35] However, this

analysis focused on sales of all canned tuna relative to lunchmeat, red meat, and other seafood products and, therefore, did not isolate the shift of consumption away from unlabeled tuna and toward products bearing the dolphin-safe label. More recently, after the New Zealand hoki fishery received its MSC certification in 2001, the Unilever corporation increased its hoki purchases by an estimated $3 million.[36] Hoki prices rose in the year after certification although the portion of the rise attributable to ecolabeling is difficult to estimate precisely.[37]

Overall, there is still very little evidence on the market demand for ecolabeled seafood. Survey results indicate that consumers would be willing to pay a premium for their favorite ecolabeled fish in restaurants and supermarkets, and case studies of specific fisheries indicate that ecolabels can increase returns to the industry.[38] Yet the magnitude of the "ecolabel effect" on demand appears to be small. In order for consumers' purchasing decisions to influence the sustainability of fisheries, the price effect would have to pass through the marketing chain to provide a sufficiently large incentive for fishermen to change their harvesting practices.[39] It is also important to remember that the existing evidence on market demand is almost entirely based on anecdotes and survey questions that ask consumers to speculate on their *hypothetical* future purchasing decisions. There is almost no market-based evidence on how consumers have actually reacted to the recent introduction of fresh and frozen seafood products that have been certified by MSC or other organizations.

Emerging Issues in Seafood Ecolabeling

The impact of ecolabeling on the demand for seafood is one of many questions raised by the recent growth in the supply of "sustainable" seafood. Other interesting issues for industry experts, researchers, and policymakers to consider include labeling conflicts, the impact on the demand for seafood products that lack ecolabels but meet standards for sustainability, and the impact of ecolabeling on environmental quality.

Labeling Conflicts

Labeling conflicts can occur when different ecolabeling schemes use the same terminology with different interpretations, or when they present conflicting information. For example, consider two of Alaska's fisheries: coho salmon and king crab. The Marine Stewardship Council, Seafood Watch, NOAA's Fish Watch program, and the Alaska Seafood Marketing Institute all seem to agree that the coho salmon fishery is sustainable. Coho salmon has MSC certification, Seafood Watch gives it the "green light," NOAA's Fish Watch program notes that Alaska's stocks are healthy, and the Alaska Seafood Marketing Institute ("ASMI") advertises that coho salmon is one of many sustainable fisheries in the state of Alaska, which is "one of the most bountiful fishing regions on the planet, and has been recognized as a world model for sustainability."[40]

There is less agreement on Alaska king crab. While ASMI includes king crab among its list of sustainable fisheries, the crab fishery does not have MSC certification.[41] NOAA and Seafood Watch both report that Alaska's red king crab population is healthy, but note that the pots used to catch crab can disturb aquatic habitat and result in bycatch of females, juveniles, and non-targeted species.[42] These concerns motivated Seafood Watch to give Alaska king crab its "yellow light."[43]

The differences in the way NOAA, MSC, Seafood Watch, and ASMI characterize the sustainability of Alaska's king crab fishery exemplify a broader issue in ecolabeling and green marketing. Rapid growth in green marketing claims, conflicting reports, and vague language can leave consumers misinformed or confused. This is especially true when products are advertised using adjectives like "sustainable," "renewable," "eco-friendly," and "green," which are inherently vague or at least open to interpretation. In response to the growth in environmental marketing, the Federal Trade Commission recently began reviewing its *Guides for the Use of Environmental Marketing Claims*, more commonly known as the "Green Guides." This process may affect seafood ecolabeling practices because one of the issues being reviewed is the allowable use of the word "sustainable" among other environmental buzzwords that are frequently used in product labeling and advertising.[44]

Unlabeled Sustainability: The Case of Chesapeake Bay Oyster Aquaculture

A second issue is that the best known ecolabeling schemes do not necessarily identify the fisheries with the strongest potential for sustainability. Oyster aquaculture in the Chesapeake Bay provides an example. In the 1950s, the Chesapeake Bay was by far the nation's largest oyster fishery. Since then, disease and habitat degradation have caused annual landings for the native Bay oyster (*Crassostrea virginica*) to decrease from 30 million pounds to 0.3 million pounds, cutting U.S. oyster production in half.[45]

Small oyster harvests pose a concern for commercial growers and people who care about water quality in the Bay. The oyster fishery provides a source of income for growers and an economic base for some Chesapeake Bay communities. In addition, oysters provide ecological services, particularly water filtration. By filtering phytoplankton (and seston in general) oysters help to improve water clarity.[46] The nitrogen and phosphorus embodied in the filtered material can be removed from ambient waters through natural biomass sequestration as well as through natural chemical transformation of oyster feces and pseudofeces.[47] These processes in turn aid the growth of submerged aquatic vegetation and help to protect essential habitat for other aquatic species.[48] The Chesapeake Bay states have noted the importance of restoring oyster populations by signing the Chesapeake Bay 2000 Agreement, which aims for a tenfold increase in native oysters in the Chesapeake Bay by 2010, among other goals.[49]

Commercial oyster aquaculture, which involves submersing oysters in cages or floats, provides water quality services without further depleting the wild oyster stock. This is a proven way to overcome the disease, predation, and habitat degradation problems that have plagued oyster restoration in the Chesapeake Bay region.[50] If aquaculture is proven to be a financially viable means of producing oysters, it may relieve pressure on wild stocks.

Given the fishery's extraordinary credentials for sustainability, developing an ecolabel for aquacultural oysters would appear to have strong potential to promote conservation and reward growers for the water quality services they provide. Ironically, the MSC ecolabel is not available to the Chesapeake Bay's aquaculture oyster fishery because it is a form of aquaculture. NOAA's Fish Watch program does not currently include aquaculture oysters among the species it tracks, and the Chesapeake Bay growers do not currently engage in green marketing.[51] While Seafood Watch gives aquaculture oysters a "green light" and recognizes their water quality services, the Seafood Watch pocket guides are only distributed in a limited number of restaurants and groceries.[52] Thus, consumers may be largely unaware that unlabeled aquaculture oysters from the Chesapeake Bay meet Seafood Watch's definition for sustainability and provide additional water quality services.

The Impact of Ecolabeling on Environmental Quality

Ecolabeling is a decentralized tool for obtaining the goals of environmental *policy*. Will this tool lead to improved environmental *quality*? Recent research in economic theory has suggested that the development of markets for "green" goods presents both advantages and disadvantages with respect to environmental quality, and the net effect may be product specific.[53] The possibility that the introduction of green goods could have a detrimental effect on environmental quality is counterintuitive, but can be illustrated by an example.

One of the key questions is whether the dimension of sustainability that is highlighted by an ecolabel is a substitute or a complement for the seafood product itself. For example, aquaculture oysters remove some nitrogen and phosphorous from the Chesapeake Bay through their normal filtration of water and consumption of phytoplankton. Many consumers may enjoy eating oysters and may also want to improve water quality in the Chesapeake Bay. But these same consumers may be reluctant to eat "green" oysters that are labeled in a way that highlights the fact that they remove nutrients from the Bay. Is there a special health risk associated with eating aquaculture oysters? Will they taste bad? Of course not. Wild oysters provide the same water filtration services as aquaculture oysters, and all saleable oysters must be harvested in waters that are approved for shellfish consumption. The point is that it may be difficult to convey this to consumers as part of an ecolabeling strategy that centers on water filtering services rather than simply one promoting sustainable harvests. If oyster lovers are turned off by the idea that aquaculture oysters are advertised as filter feeders (the "kidneys" of the Chesapeake Bay), they may seek out oysters from wild populations that are harvested in a less sustainable manner.

A second issue is that the introduction of ecolabeled seafood products (and "green" goods in general) has the potential to drive out donations to environmental organizations. If consumers feel that they are making their contribution to the health of aquatic ecosystems by paying a premium for ecolabeled seafood, they may be reluctant to make charitable contributions to environmental organizations such as the Chesapeake Bay Foundation.[54] In this case, whether the introduction of a market for ecolabeled seafood will ultimately improve the health of an aquatic ecosystem will depend partly on whether environmental organizations are more or less effective in improving environmental quality than fisheries which meet the criteria for sustainability that are reflected by the presence of an ecolabel.

Conclusion

The challenges in developing sustainable fisheries are well known. In the past, governments have sought to overcome these challenges through policies which limit fishing effort, catch rates, and harvests for wild fisheries. Ecolabeling offers a more decentralized approach to environmental policy by seeking to illuminate the connection between the choices we make in the marketplace and their environmental consequences. While the ecolabeling of seafood is still relatively new, a variety of government, industry, and independent third-party organizations have developed schemes during the past decade to measure the sustainability of fisheries.

Evidence based on the number of fisheries that have obtained or are currently seeking ecolabeled status suggests that the market for ecolabeled seafood will continue to grow. The number of wild fisheries seeking MSC certification is more than double the number of fisheries currently certified. This growth raises a number of important questions. Is there a significant long-run demand for ecolabeled seafood, or are fisheries overly optimistic? How can conflicting ecolabeling claims be resolved? Will the introduction of ecolabels decrease the demand for sustainable seafood that is not ecolabeled? Will ecolabeling actually improve the health of aquatic ecosystems? What are the best strategies for conveying ecolabel information to consumers to maximize the market advantage of environmentally sound fisheries? These are important topics for economic research and legal analysis.

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